June 1965

EMO

NATIONAL DIGEST

Project Harbor

Tsunami Warning System

United States Analyses French Plan ORSEC

EMO Report to Canadian Mayors

EMERGENCY MEASURES ORGANIZATION

EMO NATIONAL DIGEST

Vol. 5 • No. 3
June, 1965

Published by
The Emergency Measures Organization, Ottawa, Ont.

Contents

Project Harbor ..... *A Report*

Tsunami Warning System ..... *John H. Erb*

United States Analyses French Plan ORSEC ..... *A Report*

National Development in Emergency Measures ..... *P. A. Faguy*

The EMO NATIONAL DIGEST publishes six editions annually to provide current information on a broad range of subjects dealing with civil emergency planning. The magazine is published in English and French and may be obtained by writing to the Emergency Measures Organization, Daly Bldg., Ottawa.

In addition to publishing articles which reflect Canadian Government policy the Digest may also publish articles by private individuals on subjects of current interest to the emergency measures programme. The views of these contributors are not necessarily subscribed to by the Federal Government.

Director: P. A. FAGUY *Editor:* A. M. STIRTON

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1965

PROJECT HARBOR

U.S. Summary Report on Civil Defence

During the winter of 1962-63 the Assistant Secretary of Defence for Civil Defence requested the National Academy of Sciences to organize a summer study in the field of civil defence. The study, known as Project Harbor, was under the Directorship of Dr. Eugene P. Wigner and the Deputy Directorship of Dr. Lauriston S. Taylor, Chairman of the Academy's Advisory Committee on Civil Defence. It was carried out at the Academy's study center at Woods Hole, Mass.

The following report represents a condensed version of the approximately 1,000-page report of the study group.

Foreword

IT IS DIFFICULT to report on a group effort such as the Harbor Study because the change in attitudes and intuitive convictions acquired by the members in the course of the study are at least as important a result as the technical conclusions. For many participants, the most striking experience was the ease with which contacts between members with different backgrounds and interests were established and how the appreciation of relevant problems—physical, technical, economic, societal and even emotional—grew in members of the group. This experience is good augury for the success of a concerted effort undertaken jointly by specialists in many fields.

On the other side of the picture is the fact that Harbor has introduced few entirely new ideas and uncovered no panaceas. The promise of coupling antiballistic missile systems with passive defense was increasingly realized. This coupling would make the task of the former easier and the measures of the latter more effective as far as the preservation of lives is concerned. Perhaps less striking but probably more important were the general conclusions, some of which follow.

The most significant change in the threat of the foreseeable future is expected to come from more numerous more efficient, and more powerful nuclear weapons rather than from weapons of essentially new types. Thus, a civil defense system could be instituted now which would not be rendered ineffective by changes in the nature of offensive weapons of the foreseeable future.

Nuclear war would result in great loss of life, great devastation, and great misery. But appropriate protective measures which are well within the economic means of the nation could drastically reduce the number of casualties. Even without such protective measures, situations in which all life on earth would be destroyed can in the foreseeable future occur only in fiction.

The preservation of the economic wealth of the nation is a more difficult task, and perhaps also more costly, than the preservation of lives. It would take many years after a nuclear war to make all the commodities that we now take for granted generally available. On the other hand, if some elementary and relatively inexpensive measures are taken ahead of time, no famine need result and there would be no crippling shortage in the other immediate necessities of life.

The management and operation of a civil defense program of reasonable size and effectiveness might require a federal cadre of about 30,000 professional people, cooperating closely with local authorities and using local capabilities. It was one of the conclusions of the project that a civil defense program along the lines described in the project reports and this summary would not seriously interfere with the normal functioning of our institutions nor of our democratic society. It would create no serious problems of acceptance or impact, at home or abroad. In the opinion of many, it would reduce tension and would further constructive thinking.

I wish to express thanks to all who participated in the Harbor Study, and to the government agencies that provided information and administrative assistance. Although representatives of these agencies participated directly in the study, the conclusions and recommendations of the Project Harbor reports do not necessarily reflect the official position of these agencies.

EUGENE P. WIGNER
Director

Introduction

Establishment of Project Harbor

In early 1963, the Assistant Secretary of Defense (Civil Defense) requested that the National Academy of Sciences arrange for a study of civil defense problems. Pursuant to this request, the Academy invited a group numbering over 60 and consisting mainly of scientists and engineers, from universities, private industry, and government organizations, to participate in

91960—1

a six-week meeting beginning August 5, 1963, at the Academy's summer-study facility at Woods Hole, Massachusetts. The group was requested to examine the likely effects of various kinds of attacks on the United States, and the present and future problems of civil defense of the country. The technologies of passive (civil) defense were considered both independently of active (military) defense systems such as anti-ballistic missile systems, and, as far as time permitted, in conjunction with them. The study group was divided into six panels: Acceptance and Impact; Education and Training; Strategy and Tactics; Future Weapons and Weapon Effects; Immediate Survival; Postattack Recovery.

Organization

The study, known as Project Harbor, was under the leadership of Eugene P. Wigner, Princeton University. He was assisted by an executive committee consisting of Lauriston S. Taylor, National Bureau of Standards, who was Deputy Director; Jack A. Vernon, Princeton University; John S. Coleman and Richard Park of the National Academy of Sciences staff; L. Joseph Deal, Atomic Energy Commission; and Jack C. Greene, Office of Civil Defense.

Briefings

The first week of the study was devoted to a series of briefings concerning the technical factors that influence civil defense. Thus, the Defense Atomic Support Agency described nuclear weapons and their effects, the Air Force's Warfare Systems School discussed U.S. military capabilities in air defense and in offensive weapon systems, the Defense Department's Defense Intelligence Agency described the offensive and defensive weapon systems of the USSR, and Leon Gouré of the RAND Corporation summarized his conclusions on the USSR civil defense system.

The results of various studies of hypothetical attacks on the United States were presented by the Office of Civil Defense, the National Military Command Systems Support Center, the Weapons System Evaluation Group, and the National Resources Evaluation Center. The Atomic Energy Commission provided briefings on the biological effects of nuclear weapons, in particular on blast biology, radiobiology, damage from thermal radiation, and long-term effects of nuclear radiation. The Office of Civil Defense and the Office of Emergency Planning discussed their plans and programs.

The week of briefings ended with consideration of possible future weapon systems. The development trends for nuclear weapons were discussed by Edward Teller and Carson Mark, and the problems of the anti-ballistic missile systems by representatives of the Institute for Defense Analyses.

The formal briefings were supplemented by informal lectures by Herman Kahn and Edward Stillman of the Hudson Institute on their projections of the international situation into the 1970's.

Reports

Each of the six Project Harbor panels prepared a report in its assigned area. These reports constitute the major output of Project Harbor; they are transmitted to the Office of Civil Defense with only minor editing revisions.

In response to a request of the Office of Civil Defense, some of the conclusions of the Harbor Study were summarized in a very brief report submitted to that agency in February, 1964, by the president of the National Academy of Sciences. The present more extended summary gives more detail than the report just mentioned. It is, essentially, an integrated composite of the summaries of the six panel reports, and may be considered as an introduction to them.

There was a clear consensus of the study participants concerning such major questions as the technical feasibility of achieving civil defense protection and capability for recovery which is much greater than that so far contemplated. A few points of disagreement remained, however, in the panel conclusions. In the present report, the Executive Committee of Project Harbor has attempted in some degree to resolve these.

Panel Summaries

Summaries of the reports of the six panels follow:

Acceptance and Impact

Assignment of the Panel

The objectives of the panel were to explore the basis for attitudes on civil defense, and to consider the reasons for objections and whether and how they could be met.

Conclusions on Acceptance

Acceptance of military programs, including those for civil defense, depends on the view that there exist national and personal values that are worth fighting for and preserving at any cost. This view leads to the support of a national policy and program of civil defense, and to the realization that it is a social as well as personal responsibility of each individual to make every effort for survival.

If civil defense is to be recognized as a valid means of discharging this responsibility, its unequivocal acceptance by the President, the National Security Council, the Joint Chiefs of Staff, and the Congress is necessary. The more vigorously these individuals and groups exercise their leadership and set examples, the more favorable will be public attitudes toward the program, and the more willing responsible governing bodies will be to contribute to it.

Public attitude will be influenced also by the character of the program. The acceptability of programs is enhanced if they have the following characteristics:

1. The federal government accepts full responsibility for them, as parts of total national defense, provides initiative, and sets an example for state and local administrative units.

2. The leadership of the program has strong, specific support from the armed forces, clearly linking the program to the total defense of the nation.

3. They are conducted by professional, technically qualified personnel.

4. They make maximum use of the available capabilities of communities, such as fire and police protection, and do not overlap and compete with these.

5. They do not involve the general public except when clearly necessary for effectiveness of the program, or when there is popular demand to do so.

6. The rate of growth is not so steeply accelerated as to take the form of a crash program.

7. They are large enough in total effort to appear sufficient to meet anticipated requirements, rather than so small as to appear patently inadequate. On the other hand, massive programs, particularly if steeply accelerated or crash-type, would be acceptable only if international relations severely deteriorated.

8. Their objective is equitable protection for all Americans, and they have a high legacy value in relation to subsequent program changes.

9. They lead to dual use of facilities and organizations; for example, the use of shelters as garages and for storage or recreational purposes, and the use of civil defense forces to help in floods and other natural disasters.

10. They contribute to the reduction of anxieties and tensions by being coupled with other efforts of the government to assure national survival.

11. The federal government provides continuing, candid, and reliable information.

Conclusions on Impact

Programs with the above characteristics not only would be acceptable, but also would tend to minimize the possible detrimental effects—psychological, social, economic, domestic, political, and international. It is extremely difficult, of course, to prove that no harmful effects whatever will accrue from any major activity. But charges that programs of the type described above will change the nature of our society, or lead to a garrison state, or alter American values beyond recognition, or produce widespread anxiety, are entirely unsupported by the evidence. Similar charges have accompanied all major national programs in the past, whether it was the adoption of federal income tax, New Deal legislation, universal military training, or the civil defense measures undertaken so far. If executed in a reasonable manner, the impact of a civil defense program on the spirit of our community and the vigor of our institutions will be favorable.

In those foreign countries, such as Sweden, where a significant effort toward an effective civil defense posture has been made, there has been no evidence of deleterious impact, either internal or external. Furthermore, serious acceptance problems have not been encountered.

Education and Training

Assignment of the Panel

The objective of the panel was to examine the problems of (a) education of civil defense officials, (b) keeping the national and local leadership informed of the problems and status of civil defense, and (c) educating and training the public in consonance with the civil defense programs discussed and described by the other panels.

Conclusions

Clearly, a vigorous program of education and training must be an integral part of any civil defense effort, large or small. The Education and Training Panel of Project Harbor suggests a program consisting of five parts:

1. *Training of Technical Personnel*

Short courses and training programs could give those in technical professions special knowledge concerning thermonuclear war and problems of protecting and recovering from it.

2. *Informing the General Public*

The principal means would be through

a. adult education, including general orientation and self-help courses, offered by qualified institutions;

b. job-connected orientation, introduced through employers, unions, etc.;

c. general information disseminated by the mass communications media; and

d. secondary-school education by introduction of material into secondary-school curricula.

3. *Training an Operating Organization: the Professional Civil Defense Cadre*

Adequate education and training of such a cadre will require

a. establishment of a preparatory training and orientation program for recruits to the cadre;

b. establishment of a command school to prepare cadre personnel for advancement and command responsibility; and

c. establishment, within such a command school, of a planning section to contribute to the development of general policies and procedures for the civil defense establishment.

4. *Training a Civilian Reserve Corps*

To be economically acceptable, a professional cadre would have to be small—too small to be able to man all the positions of an adequate civil defense organization. An additional organization, to be called a civilian reserve corps, is needed to provide additional manpower that would be necessary in an emergency. Its training should

a. provide corps personnel with the knowledge of the functions expected of them. These func-

91960—2

tions would form part of the procedures of the entire civil defense organization.

b. establish familiarity with shelter facilities and their use; and

c. enable corps members to teach shelter occupants basic nuclear hygiene and instruct them concerning postattack recovery plans and procedures.

5. Establishing a National Civil Defense Research Center

The research center is viewed as a key element in the total education and training program, as well as in the research effort. In addition to integrating the total national effort in education and training, and in research, it would provide impetus toward improved approaches to old problems, and would evaluate available solutions.

Strategy and Tactics

Assignment of the Panel

The Strategy and Tactics Panel was assigned the task of describing the circumstances surrounding the outbreak of a nuclear war, the probable course of events during hostilities, and the circumstances leading to their cessation, and thus to provide the other panels with visualizations that would be useful to them in carrying out their assignments. The panel also examined a number of studies and calculations on the degrees of civil defense protection achievable at various costs under a range of probable attacks. These calculations served as an orientation for Project Harbor throughout the study.

Summary

Because the Strategy and Tactics Panel's assignment was primarily to provide the other panels with useful visualizations rather than to reach conclusions, its report is quite different from those of other panels. The present summary is thus limited to a discussion of three types of attack situations considered by the panel. These are designated as Alpha, Beta, and Gamma.

Alpha. The most extreme situations, the Alpha types, relate to attempts to annihilate the United States in a surprise attack "out of the blue". According to one Alpha situation, the enemy secretly procures enormous numbers of unhardened missiles capable of carrying very-large-yield warheads. The enemy picks a time for, and launches, an optimized salvo at the 200-300 largest cities, together with a supplementary attack on rural areas and on our retaliatory capacity. The force directed at our retaliatory capability is inadequate to neutralize it, and thus, both sides suffer extremely heavy damage. Such pre-planned, all-out, secret attempts at destroying the United States are considered implausible by the panel because (1) the enemy would not be willing to accept the high risk of being himself destroyed by the undamaged portion of our retaliatory forces; (2) an enemy would not wish to spend funds on such vulnerable and provocative weapons; (3) the prolonged, absolute secrecy required would be too difficult to maintain.

Situations of the Alpha type are not very likely, but cannot be completely excluded from consideration.

Beta. Beta types assume that the enemy makes the destruction of our retaliatory capability the major objective, either with attack on U.S. population a secondary mission, or with the threat of such an attack used as a blackmail ultimatum. If the enemy attacks the population, he must be prepared for retaliation in kind with an effectiveness that would depend on the success of the attack on our retaliatory forces. If, however, the enemy in his first attack avoids hitting civilians, our response would quite likely be against military rather than civilian targets, and would be followed by bargaining.

Thus the type of Beta attack in which civilian casualties are avoided might appear, in the eyes of the enemy, to be safer and lead to more satisfactory results. It therefore seems the most likely of the Beta types.

Gamma. In Gamma situations, a crisis erupts into general thermonuclear war only after many intermediate steps that might take weeks or months. The opening crisis could take place in any one of several local conflict situations. The possible intermediate steps include violence, official protests, armed intervention, ultimata, evacuation, exchange of notes, military demonstrations, nuclear demonstrations, armistice, armistice violation, and many others. At almost any point, the tension could relax, and the imminence of general nuclear war recede. On the other hand, in crises the possibilities of inadvertent war increase.

Gamma types have higher probability than the others.

Assessments

1. General nuclear war is unlikely to occur except after a build-up of tensions—possibly even after limited military action—that would provide days to months of strategic warning.

2. If this view is correct, the warning problem would be eased, and crisis actions, such as strategic evacuation and improvised shelter construction, would be made possible. Planning that would render such crisis effective should be carried out as soon as possible.

Future Weapons and Weapons Effects

Assignment of the Panel

The panel assignment was to review the possible directions in which the development of future weapons may lead in order to determine the range of threats that should be considered.

Conclusions

While it is obviously impossible to foresee future weapons systems accurately, it is believed to be most unlikely that the general features of a civil defence system designed to protect against nuclear attack with present weapons would be invalidated in the foreseeable future. The panel conclusions follow:

1. Nuclear weapons appear to be the most serious threat to our lives in the event of a major attack on the United States.

2. Nuclear weapons will become more efficient, i.e., will have a higher yield per unit weight. Their total yield will probably also increase. However, their effects will not change in nature.

3. New attitudes about appropriate targets are likely to develop as the number of nuclear weapons available to an attacker grows.

4. The fire effects even from the largest weapons would not gravely complicate the design and development of an effective shelter system.

5. Very large-yield explosions deep in the ocean can cause damaging tidal waves along extensive coastal shores, but the expected damage and loss of life would be very much smaller than those to be expected from explosions of the same magnitude in close proximity to the harbors or cities under attack.

6. Biological agents pose a lesser threat than nuclear weapons to the civilian populace because their delivery involves extremely difficult logistics problems and their effectiveness will always be subject to large uncertainties introduced by weather and possible countermeasures.

7. Chemical warfare is even less likely to be of major influence on civil defence, since chemical agents are less effective in producing casualties than biological agents and far less effective, per pound of weapon, than nuclear weapons.

8. The so-called neutron bomb, if it could be produced, poses no real strategic threat to cities.

9. Enhancing fallout by creating special radioactive isotopes necessarily reduces the blast and thermal yields for the same bomb weight. More importantly, although their use can provide a small increase in dose rate for a useful length of time, they would not provide any increase in total fallout dose.

10. Only under conditions of weather, season, and geography that are favorable to the occurrence of large-scale fires in peacetime will nuclear detonations produce large-scale wild-lands fires. Large forest fires are possible but is it not reasonable to fear that all our woodland could be denuded; this is because weather conditions favorable to fire-spread do not occur simultaneously over all parts of the country.

11. Fires in communities constitute a serious menace that deserves attention. It should be noted, however, that, except for short spurts, fire-spread is generally slow, averaging about one tenth of a mile per hour, and seldom travels farther than five or ten miles in any direction even in areas of plentiful combustibles. In many suburban areas and in most rural areas, fire will not spread significantly and damage is likely to be limited to isolated fires from individual ignitions. Spread of fire is less sensitive to weather conditions in urban and suburban areas, however, than in wild lands.

12. Even in mass fires, the fraction of casualties among the population is generally small. However, casualties may rise seriously when blast damage accompanies and aggravates the fire problem. Many persons trapped in or under collapsed buildings could become fire casualties, and persons driven from shelters that do not provide fire protection could become fallout casualties.

13. The number of fires induced by thermal radiation can be significantly reduced by simple precautionary measures prior to attack: clearing or covering of rubbish, removal of flammable curtains, or shuttering windows with reflective shades or aluminum foil. Such measures would be less effective in regions of appreciable blast.

14. Firefighting in areas where thermal ignitions have occurred can be most effective in the first few minutes after exposure. Even in the absence of blast or immediate fallout, no prompt help can be expected from normal fire departments. The large number of small fires that are most likely can best be controlled by people on the spot if they have some understanding of the situation, and by the mobile units to be discussed in the next section.

15. The increasing extent of blast damage, including damage to recovery capability, to be anticipated in the event of attacks against cities in future years points to the need for blast protection in conjunction with fallout and fire protection.

Immediate Survival

Assignment of the Panel

The assignment of the Panel on Immediate Survival was examination of the problems of protecting the populace during nuclear attacks and of ensuring their survival for a period of about two weeks following the last attack. The problems of warning, shelter construction, supplying the essentials of life, communications and control, morale, and preparation for recovery were included in the assignment.

Summary

The panel concentrated its efforts on formulating principles of a civil defense system, on visualizing how it would function, and on indicating the steps whereby civil defense capabilities might be improved.

Principles of a civil defense system. Principles advocated by the Immediate Survival Panel that deal

91960—2½

with federal responsibility, professionalism, the dual- or multi-purpose nature of the installations, equity in protection, use of local capabilities, and the desirability of a continuous, steady buildup have already been mentioned in the conclusions of the Acceptance and Impact Panel. These principles were proposed by both panels. The Immediate Survival Panel advocates their adoption, and adoption of the following additional principles:

1. A unified command structure is the most effective way to meet the requirements of warning, evacuation, sharing of resources, and similar functions.

2. Civil defense planning should be carried out so that preparations fit local situations. At the same time it should be compatible with enlightened peacetime planning and organization.

3. The planning of civil defense measures should go hand in hand with the planning of active defense measures, particularly of the anti-ballistic missile system.

4. The protection of the population should be applicable to a variety of threats, cover the spectrum of probable attack sizes, and provide roughly equal chance of surviving fire, blast, or radiation.*

5. The system should not only be effective when it is completed but also provide increasing protection while it is being established.

6. Planning, organization, and training in advance are essential even for crisis programs. (See also the Strategy and Tactics summary.)

Cadre of civil defenders. To put these principles into practice, a professional organization, identified in earlier sections as a cadre of civil defenders, would be needed. In size, such a cadre might approximate the Coast Guard or the Public Health Service, i.e., have about 30,000 full-time employees. In carrying out its duties of planning, organizing, and particularly of operating a civil defense system, supplementary help from the civilian reserve, also mentioned previously, would be required.

Physical preparations. In conformity with the preceding principles, physical preparations would be planned and supervised by the cadre of civil defenders, assisted by local representatives so that the general plan would be adapted to local conditions and circumstances.

The main element of physical preparations is the equipped shelter. Four general classes of such shelters can be distinguished. Class I provides protection aginst an overpressure of 100+ psi and has a radiation-protection factor** (PF) of 10,000 or more. It also protects against fire and permits escape even if covered by hot rubble. Class IV corresponds to the present fallout shelters, which have a minimum PF of 40, the average being about 200. They have no specific provision for blast or fire resistance but do not increase the danger from these hazards. Shelters of Classes II and III are between these in degree of protection both against radiation and against heat and blast.

The present fallout-shelter system could be made more effective by adopting ten further measures:

1. Extension of the program to residential, nonurban areas to accommodate the population at night as well as in daytime.

2. Survey of existing shelters to locate those that can be easily converted to Class III. They provide a protection factor (PF) 100 against radiation, protect against an overpressure of 10 psi, and provide fire refuge for a few hours.

3. More complete provisioning of the shelters and establishing of storage depots for food and medical supplies all over the country.

4. Regulations for the incorporation of shelters into new buildings as they are constructed. (In Denmark, Finland, the Netherlands, Norway, Sweden, and Switzerland, shelters are obligatory in new buildings designed for occupancy by more than one family.)

5. Construction of new, Class II and Class I, single- and dual-purpose shelters.

6. Establishment of dispersal centers in the vicinity of cities to serve also as headquarters for civil defense personnel.

7. Construction of shelters and other facilities for utility personnel to permit manning and rapid repair of utilities. This measure is actually designed to facilitate postattack recovery.

8. Organization of mobile units, equipped with shielded vehicles, to maintain order outside the shelters, to engage in minor firefighting, to help in evacuating people where this is most urgent, and also to inform the sheltered population of events outside, in particular the radiation level.

9. Encouragement of private construction of shelters. (Several large enterprises have already taken steps in this direction.)

10. Provision of protection for farm animals.

Few of these measures are new, but all would increase the effectiveness of the present system.

The following table gives estimates of the cost of a single shelter space (for a single person, ten square feet) in mass-produced shelters. This cost depends, naturally, on the size of the shelter and its effectiveness. It does not include the cost of the space that the shelter would occupy or of eliminating possible interference with utilities. On the other hand, neither does it take credit for other possible use nor does it assume the utilization of tunnels, underground passages, and similar facilities.

Note that this principle differs from the one in the summary of the Panel on Acceptance and Impact which calls for providing the population with protection that corresponds in degree of effectiveness with the anticipated degree of danger.

**This term expresses the relative reduction in the amount of radiation that would be received by a person in a protected location compared to the amount he would receive if he were not protected.*

ESTIMATED COST OF SHELTER SPACE*

Size of shelter	*Class I 100 psi, 10,000 PF*	*Class II 50 psi, 200 PF*	*Class III 10 psi, 100 PF*
100 space	$300/space	$250/space	$200/space
1000 space	$175/space	$140/space	$110/space

Five functions of civil defense. To cope with problems during and immediately following the attack period, and to make effective use of the preparations, civil defense will have to perform five principal functions. All of them rely not only on the physical preparations but also on highly competent and, in some cases, specialized personnel. The five functions are: (1) command, (2) warning and communications, (3) firefighting, rescue, police, damage assessment, repair, decontamination, (4) medical and personal care, resource allocation, and (5) repair and maintenance of shelters and of other equipment, particularly of mobile units.

The cadre of civil defenders must be ready and able to carry out all these functions and must be equipped for them. This implies considerable operating expenditures and the maintenance of high morale and esprit de corps. Continued improvement of physical and educational preparations would contribute to these requisites.

Proposal for a prototype system. The need for data on requirements, as well as for an operational doctrine for operating a civil defense system, leads to the requirement that a complete prototype system, including shelters, sector staff, and district staff, be constructed. Our country has no personnel experienced in the operation of a complete civil defense system.

In the absence of even a prototype of a coherent system, the results of computer studies of highly idealized, model shelter programs can be accepted, at best, only with reservations. The panel deplored a tendency to equate "model shelter programs" with an operational civil defense system.

Time-phasing. Achievement of the desired civil defense system is handicapped by legal, social, political, and budgetary restrictions. The changes can be described in three time periods: transition, build-up, and maintenance.

The prototype system, representing urban, non-urban, and near-target situations, should be selected and staffed. Shelters and headquarters should be built, utilities hardened, and other construction activities of the prototype system should be undertaken on a small but realistic basis.

**OCD estimates the* incremental *cost of putting 100-PF fallout shelters in new construction, such as is called for in the proposed shelter development program that went before Congress in 1963, would be 40 dollars per space.*

For the transition stage, the relation between federal and state responsibility needs re-examination. The Civil Defense Act of 1950 does not fully remove confusion concerning responsibility. The clear specification of authority and responsibility has been represented as one of the bases for the success of the civil defense effort in Sweden.

Additional Information on Total Shelter Systems

(The following statement was prepared after the report of the Immediate Survival Panel was written, and has not been examined by that panel.)

Various shelter postures are possible, beginning with the present, fallout-shelter-only posture. The marking, provisioning, and other preparation of these shelters could be accomplished at the present rather modest level of expenditure. Far toward the opposite end of the spectrum of possible postures would be a system which could accommodate the inhabitants of all cities with a population in excess of 250,000. All together, 75,000,000 people live in such cities, and the cost of providing Class I (100 psi, 10,000 PF, fireproof) shelters for them may be $20 billion. Recent studies indicate that such shelters, together with fallout shelters for the remaining population, could protect the lives of 80 per cent of the U.S. population against an anti-population attack of 3,000 MT, provided that the warning is received in time for the population to reach the shelters.

In considering the relation of civil defense to the anti-ballistic missile system, it should be noted that a Class I shelter protects its occupants against the blast from a 1 MT weapon exploded at least 5,000 feet above ground level; for a 10 MT weapon, the corresponding altitude would be 11,000 feet, and, for a 100 MT weapon, 23,000 feet. It seems evident that it would be easier and less expensive to establish an anti-ballistic missile defense which could intercept at a height of about 15,000 feet than one that had to intercept the missiles before they enter the atmosphere. Such an active defense system would afford protection of shelter occupants against the weapons now available. The possibility that a combination of active and passive defense might eventually provide protection for a very large fraction of the population, even against extreme forms of attack, emphasizes the need of close coordination of civil defense planning and the planning of active defense. It should be noted, however, that an active defense of the kind envisaged would not prevent explosions at higher altitudes, which, though not affecting shelter occupants, could be highly destructive to buildings and facilities.

The possibility of an effective combination of active and passive defense should not obscure the fact that civil defense is effective by itself.

Postattack Recovery

Assignment of the Panel

The Postattack Recovery Panel was principally concerned with the period after the cessation of hostilities and with the situation in which the radioactivity has decayed sufficiently so that people could emerge from shelters for extended periods. The problems then would be to provide people with the immediate necessities of life, to inform them of the state of their surroundings and, with minimum delay, to start the work of reconstruction and the restoration of social, economic, and governmental structures.

Summary

In the consideration of postattack recovery problems, one general theme appears to predominate throughout: additional or continuing research is needed to define postattack problems in quantitative terms and to evaluate the relative effectiveness of proposed measures to alleviate postattack situations.

The Recovery Panel proposes three types of measures. The measures of the first type would go hand in hand with those proposed by the Immediate Survival Panel and would aim at a reduction of the damage to our resources, such as food stocks and water and power sources. The second type of measures deals with the distribution and management of supplies and would help to sustain the population during the period of great scarcity that would necessarily follow a nuclear war. The third type of measures would aim at a restoration of the productive facilities and of societal and governmental structures. There is, evidently, some conflict between the last two objectives. Thus, in the economic area, the demand for commodities necessary for daily living would have to be weighed against demands for capital investment for rebuilding the economy. In other postattack problem areas, there would have to be reconciliation of the need for protecting people from radiation exposure with the demand for making an early beginning of postattack countermeasures, such as decontamination.

It should be noted that considerations leading to the conclusions on economic recovery were based on the assumption that the attack lasts only a few days, and thus that the period for clean-up and reconstruction is neither delayed nor interrupted by a renewed outbreak of hostilities.

A factor favoring recovery capability is the great size of our resources, in particular of our food stocks and production facilities. Unfavorable factors are the current vulnerability of these facilities, their concentration in or near large cities, and their dependence on each other so that destruction of one facility may paralyze many others. Also unfavorable are the inadequacies of plans for postattack recovery. The postattack situation, when compared with the problems of an underdeveloped nation, would have the decisive advantage of having already on hand the skills needed to rebuild and operate an advanced economy. These skills may be worth more than our material wealth. The postattack situation would be more difficult than that of an underdeveloped country because of the radiation that would hamper many postattack activities, and the fact that our people are now poorly adjusted to the low level of living that would be unavoidable under postwar conditions. Help from outside the United States, or from less heavily affected areas within it, could, however, be more effectively used here than in underdeveloped countries.

A major vulnerability of the U.S. economic system, in addition to the interdependence of its elements, is its dependence on electric power, petroleum, communications, and transport. Because of interdependence and the importance of timing, the postattack measures for restoring production must follow a sequential order. For example, first priority might be restoration of power; next for that of communications, water and sewage, fuel, and transportation.

Among the various sectors of the economy, petroleum may be the Achilles heel, in that refineries, ports, and stocks are very vulnerable targets. The situation regarding medical supplies would be desperately bad if an attack came now, but could be improved relatively easily.

Adequate measures to meet the recovery requirements of a surviving population protected by the proposed OCD fallout-shelter program would probably cost as much as the shelter program itself. In a large civil defense program in which blast shelters were constructed in metropolitan areas, it would be reasonable to spend more on recovery measures than on the shelters themselves, though probably not twice as much. As shelter protection is extended, preparations for recovery should also be undertaken.

Summary of Proposals

Some of the proposed preparations are listed below under six headings.

Recovery of the social and economic systems. As a principle, the panel warns against resorting to disaster socialism unless truly necessary, since such an action would, in the long run, delay the transition from an economy based on stockpiles to a normal one in which consumption and production are balanced. The panel believes that government interference with the spontaneous recuperative process of a free economy should be held to a minimum. Whenever it has to be invoked, it should be continued no longer than necessary. In areas where some sort of price control is needed, the panel urges that it be carried out by currency and credit control rather than by outright price determination by fiat. Nevertheless, the government must make the preparations needed for it to assume complete responsibility for economic recovery. More specific proposals follow:

1. There should be an organization that would be *able* to assume responsibility for law and order in

damaged areas, manage stockpiles, and supervise the crews repairing the damage to utilities and power sources. If necessary, the organization should be able to maintain paramilitary control until the civilian rule and economy can be restored. Such an organization might be part of the civil defense cadre.

2. A Federal Asset Validation and Equalization Corporation, proposed in earlier studies, should be organized to function, principally, in less damaged areas. It would extend credits to prevent a chain reaction of bankruptcies, and help in restoring the monetary-financial structure of the economy.

3. The Program Analyses for Resource Management, an organization also proposed in earlier studies, should be used to provide information, interregional communication, and economic guidance for both local authorities and, if desired, also for individuals.

4. When necessary, key sectors of the economy, such as power and transportation, should be placed under parliamentary control, particularly if their restoration to production and their operation would be hazardous.

The functioning of the social and economic systems under stress, and when the administrative structure is impaired, should be studied intensively and with as much depth as possible. The panel urges the establishment of a program for collecting and storing data on the demographic characteristics to be expected under varied assumptions of attack and protection. Much could be learned from a study of the functioning and of the effectiveness of the stabilization and resource-management measures established in World War II. The control of purchasing power in the civilian economy by the extension or withholding of credit can be a powerful means for preventing inflation and for channeling private incentives toward desirable objectives.

Water and food supply. The panel considers that a policy of eliminating cropland from production because of high Sr^{90} or Cs^{137} contamination would be unnecessary. Rather, there should be a food triage whereby food in contaminated areas is monitored and used for human consumption, for animal consumption, or its use delayed according to the needs of the people and the contamination level. Similarly, the panel believes that cows that are not seriously affected by external radiation would generally not have consumed enough radioactive material for their milk or meat to produce serious injury to the consumer. Special care must be exercised with milk for babies, however, because of the possible effect of I^{131} on their thyroids.

The panel emphatically concurs with the recommendation of the Immediate Survival Panel that

1. Current food stocks should be relocated and the availabilities made known to local and state planning authorities. Fish protein should be added to the food stockpile.

2. Stand-by power and shielding for personnel should be available in order to ensure early operation of the water and power system.

It recommends further

3. The stockpiling of fertilizers, insecticides, and of spare parts of agricultural machinery.

4. That the fuel stockpiles be planned with due regard for the needs of agriculture and the moving of food to processing and distribution centers.

5. That current research on the behaviour of fallout particles produced by explosions over various terrains be continued in order to arrive at better estimates on the probable contamination of water in reservoirs during the later postattack periods—3 to 10 years after attack. For the same purpose, regional water run-off studies should be undertaken.

In the opinion of the panel, bacteriological contamination of untreated water is likely to be more important than radiological contamination. Information on methods to eliminate both contaminations is available and has been distributed by several agencies.

The panel emphasizes the importance of the early restoration of agricultural production. New agricultural equipment may be needed from the second year on.

Ecological recovery. The investigation of ecological damage and recovery should continue, and environmental defense should become part of civil defense. As the preceding discussion indicates, there remain uncertainties concerning the intermediate and long-time ecological consequences of a nuclear war. The methods to improve our knowledge in these areas are, however, available.

Large-scale primary fires, totally destructive insect plagues, and ecological imbalances that would make normal life impossible are not be expected. Nevertheless, in order to minimize these dangers, and to enhance recovery, it is recommended that

1. seeds be stockpiled,

2. plans be formulated for erosion control, protection of watersheds, and for reforestation, and

3. salvage lumbering of forests killed by fires or radiation be planned so that it could be undertaken within 2-3 years after the attack. Except for such salvage, it would probably require decades after a nuclear war before a significant timber crop could be produced from severely damaged lands. The reforestation would hardly begin on a large scale before five years after a major attack.

Radiological recovery. Augmented planning and training programs and an increased research effort should be undertaken.

Medical recovery. The Postattack Recovery Panel proposes the establishment of a permanent medical organization to cope with problems arising in case of a national disaster. This organization should be able to assume command functions in case of such a disaster. Increased effort is urged in the following areas:

1. Research on secondary disaster medicine, dealing with likely patterns of human disease, rehabilitation, and animal diseases.

(Continued on Page 20)

TSUNAMI WARNING SYSTEM

British Columbia Civil Defence Adopts Tsunami Warning System Responsibilities

By JOHN H. ERB,
Provincial Civil Defence Co-ordinator
for British Columbia

ON GOOD FRIDAY, March 27th, 1964, at 5:36 p.m., an earthquake which released twice the energy of the 1906 San Francisco earthquake crippled communities in south-central Alaska.

Wrecking homes and business establishments, railroads and harbour installations in Anchorage, Seward, Kodiak, Whittier and other settlements, it produced submarine landslides and seismic sea waves which caused severe damage and loss of life in coastal communities many hundreds of miles away. Shock waves were felt over half a million square miles in Alaska. The quake caused damage estimated at between one-half to three-quarters of a billion dollars. About 114 persons were dead and missing after the quake.

The main quake was reported to have lasted one-and-a-half to four minutes. The epicenter, in a sparsely settled inlet in northern Prince William Sound in the vicinity of the Aleutian Trench, is a region of high rugged topography—the center of an area dotted with volcanoes, both extinct, and known to have been active since 1760 A.D., an area where many previous large earthquakes are known to have occurred. Eighty miles to the west lies Anchorage, with 50,000 inhabitants: the smaller communities of Valdez and Cordova are 40 and 70 miles to the east and southeast.

Quick Action

The actual point of origin of the earthquake has been calculated to be about 20 kilometers (about twelve-and-a-half miles) below the surface. This relatively shallow depth contributed to the large amount of damage caused. The time factor, however, was in favor of the inhabitants: had the quake occurred during the school and business day, and at high instead of low tide, the losses would have been much greater.

There is, of course, no way to predict in advance the location, intensity, direction of fall of an earthquake. But loss of property and life through the resulting seismic sea waves, or tsunamis, can be minimized through quick action, accurate analysis of reports, accurate reporting and thorough communication.

Tsunamis, which can travel at speeds in excess of 400 miles per hour in open ocean, can cause damage exceeding that of the original earthquake. If direction and intensity can be quickly plotted and warnings sent out, evacuation and resulting saving of life and property can be achieved in communities many thousands of miles away.

The initial tsunami wave generated by the Alaska quake was first reported on Kodiak Island at Cape Chiniak, 20 miles south of Kodiak, approximately 30 minutes after the initial earthquake shock.

Without initial withdrawal, the water level in the Kodiak area came up like a fast-rising tide and peaked fifteen minutes later at 22 feet above mean low water. Two more waves followed the first with periods of 55 minutes.

The fourth, the highest, crested at 30 feet, almost one-and-a-half hours after the third wave. Successive waves, with irregular periods of between one and one-and-a-half hours, gradually diminished in height, and the tsunami died out at about 3:55 a.m.—about ten hours after the initial earthquake.

Immediately following the first report, the United States Fleet Weather Station issued a tsunami warning, and evacuation of residents from the coastal areas in the Kodiak and mainland was quickly carried out.

The tsunami generated by the Alaska earthquake caused extensive damage to many points in British Columbia, notably in towns and settlements on the west coast of Vancouver Island. Port Alberni and Alberni with 16,176 inhabitants, was hardest hit, suffering damage estimated at 2.5 million dollars to harbour installations, business establishments and shipping.

JOHN H. ERB

Because of the devastating power of tsunami to cause damage, loss of property and life, elaborate warning systems have been devised and installed, and are now in operation protecting communities throughout the North and South Pacific Oceans. With Honolulu Observatory (H.O.) as the control center, Seismograph and Tide Stations—many of

the latter with automatic wave detectors—are in 24-hour daily operation. These report direct to HO, which analyzes reports then plots locations, probable directions and intensities, time of arrival, and estimated heights of tidal waves, for all points in possible danger areas.

HO then issues bulletins to areas and specific points concerned:

(A) ADVISORY BULLETINS: Informative messages announcing occurrence of a severe earthquake, its location and estimated intensity. Should observation, calculation based on analysis, or direct report indicate a possible tsunami, all known or estimated characteristics will be reported.

(B) WARNING BULLETINS: Immediately a tsunami has been positively identified, HO will issue a Warning Bulletin, containing all known factors of direction, speed, height and ETA at selected points.

(C) STANDDOWN: HO is responsible for the cancellation of both Advisory and Warning Bulletins, and will inform all stations previously notified of such a decision.

Savings of life and property since the initiation and subsequent expansion of the Tsunami Warning System are beyond estimate. The disastrous loss of life and property in the Hawaiian Islands following the seismic sea waves generated by the earthquake of April 1st, 1946, re-emphasized the need for such a system. The tsunami following the Kamachatka earthquakes of November 4th, 1952 and the Chilean earthquakes of May 22nd, 1960 proved its value.

Following the 1946 tsunami on the Hawaiian Islands, the Coast and Geodetic Survey of the United States Department of Commerce accepted the responsibility for the development, operation and administration of the Tsunami Warning System. Various departments of the U.S. government, including Army, Navy and Air Forces, participated.

Other countries subsequently joined, assuming definite responsibilities and obligations, including the establishment and manning of tide and seismograph stations on a 24-hour-a-day basis.

To ensure the success of the system, countries joining must submit a detailed plan showing how warnings will be relayed to the public; and must also include the names of responsible individuals and where they can be reached by telephone at any hour of the day or night. The local agency must also assume the responsibility of educating the public on the dangers of tsunami; and for developing adequate safety procedures to avoid unnecessary loss of life and property. Uniform systems of reporting information must also be accepted. Terminology and abbreviations are, of course, standardized.

The need for 24-hour daily vigilance is obvious, since earthquake-generated tsunami can occur at any time. A wave from the Aleutians may reach the Hawaiian Islands within half an hour of being detected at Midway Island Tide Station. Tide Stations and Seismograph Stations are an integral part of the system, since a sea wave will normally pass a ship at sea without being detected. It may be only a foot or two from crest to trough and 80 to 100 miles in length. Tide Stations are equipped with automatic detectors which prove the passing of a tsunami.

Test Works

Canada is now a member of the Seismic Sea Wave Warning System. The Office of the Provincial Civil Defence Co-ordinator, Parliament Buildings, Victoria, B.C., has assumed the obligations and responsibilities outlined briefly above, and is now on a 24-hour-daily alert to receive and send reports. A provincial R.C.M.P. short-wave radio network is available. Air, land and sea rescue and evacuation co-ordination has been established between the R.C.M.P., the Armed Services, the Red Cross, St. John Ambulance Society, the Salvation Army, the Provincial and Vancouver Zone Civil Defence, and the public information media.

B.C.'s first test of the Tsunami Warning System took place on the night of February 3rd, 1965, and worked successfully. At 11:20 p.m. a Warning Bulletin was received from HO. R.C.M.P. Communications was instantly contacted, and the warning processed to all provincial detachments. Appropriate units of all organizations concerned were alerted and put on a stand-by basis. All radio stations, both independent and Canadian Broadcasting Corporation, were contacted immediately, and all broadcast Civil Defence bulletins as they were released. The CBC, which normally closes down at 1:00 a.m. stayed on the air until the Standdown Message was released at 3:30 a.m.

Major disasters are not new in British Columbia's colorful history. This land of rugged terrain is dominated by nature. Its citizens are aware that man is the intruder, and that natural phenomena can drive him out, at least temporarily: that tomorrow might bring a repetition of the Frank slide, the Ocean Falls slide, the Hope slide, the Granduc disaster of recent history, or the Alaska earthquake and resulting tsunami.

Citizens of British Columbia are determined that if disaster does strike, loss of life must be reduced to the minimum. To achieve this end, the contribution of Civil Defence is in organizing the capabilities of the existing agencies, in a co-ordinated effort directed at the heart of the specific problem, eliminating waste of time, effort and materials. ▲

UNITED STATES ANALYSES FRENCH PLAN ORSEC

Extracted from the final report CIVIL DEFENSE IN FRANCE *prepared for the United States Office of Civil Defense by the Stanford Research Institute of Menlo Park, California. This report was one of four in a study of European civil defence, used to analyze experiences that may be helpful in the development and operation of the civil defence programme. Plan ORSEC* is an outstanding peacetime disaster organization which contains several effective legal and operational features. Reprinted here with the permission of the United States and French Governments is Chapter IV of the overall* CIVIL DEFENSE IN FRANCE, *which was presented in August 1964.*

IV Peacetime Disaster Organization (Plan ORSEC)**

Background

Legally and traditionally, the French government has been more directly concerned with local and regional disasters than has the U.S. government. For example, operational controls and standard operating procedures are much more centralized under Plan ORSEC than they are under U.S. disaster plans.

The resources and means of coordinating and controlling disaster operations under Plan ORSEC are available for both peacetime and wartime needs, but the organization and authority would be greatly expanded in wartime, as described in the next section.

In peacetime, the main objective of Plan ORSEC is to handle potential disasters of a widespread or complex character. The major national government responsibility is for coordinating those agencies and organizations concerned with disaster assistance. The need for coordination was pointed out in the initial disaster planning study for Plan ORSEC in 1952, which concluded that emergency assistance would have to be reorganized, recognizing certain basic local limitations:

1. The individual community is often too small to handle with its own resources a disaster that spreads beyond its territorial limits or that is of very great intensity.
2. Disaster assistance is a complex operation aiming toward the protection of both people and goods. It requires specialized services that are not always available at the community level.
3. Even if resources and specialists for meeting disasters are available in the community, the financial cost may be so great that it must be met by external support (central government, department, important industrial enterprises, etc.).

These limitations are generally more serious in France—where villages are frequently quite small and have few resources—than they are in the United States. Nevertheless, these limitations are applicable in this country also for many disaster conditions.

Responsibilities

For these reasons, and because the government in France is much more centralized than in this country, the French government is given much more authority and responsibility for handling peacetime disasters than the U.S. government is. Since the French structure is ready for functioning in peacetime, it would appear to be more easily adapted to the duties required in a wartime emergency.

Management of the Plan ORSEC was established at the departmental level because French departments are generally large enough (there are 90 such administrative districts in France) to provide the coordination and specialized support necessary, and also because the prefect of the department has authority over the public services and the community governments in his department. The prefect in turn is responsible to the central French government and is therefore responsive to larger interests beyond his department boundaries.

The responsibilities of the prefect, and of his staff assistant—the departmental director of civil protection—are to study the potential hazards and, in light of the circumstances, to inventory available resources (both personnel and material). The prefect and his staff assistant must then gather the resources, and recruit and train the necessary personnel. Personnel may be available from all government agencies or from special technical agencies of a public or private nature (Red Cross, etc.).

Active military forces stationed in the department, and further support at the national level, can be called on if necessary. They can, except in situations where they are required for military duties, be requisitioned

---

*Organization des Secours.

**This description was obtained from *Interministerial Instruction for "Plan ORSEC,"* 5 February 1952; from various government publications, magazines, and newspaper articles; and from conversations with French officials.

in an emergency by the prefect. He may execute a written and signed requisition upon local forces, acting either on higher government orders or on his own authority (any request for forces outside the department would have to be coordinated with higher officials). This power has no direct parallel in the United States, although state governors do have conditional powers over their national guard forces. But the emergency military powers of state governors will be diminished even further (relative to those of a French prefect) under the new Army plan to place state adjutant generals and their staffs on active military duty in an emergency.

The prefect is responsible for an emergency plan for the department. This plan includes up-to-date lists of resources available in a disaster, such as hospitals, doctors, nurses, items of construction equipment and the companies owning them, and ham operators and other radio facilities. Lists of names are obtained from licenses and other sources, and are normally updated in the plan several times a year. Although updating may not be rigorously practiced, the procedure is essential to an operational plan. The requirements of Plan ORSEC in this regard might be very applicable to standardizing local procedure in U.S. Civil defense programs.

Four functional activities fall within the natural responsibilities of four chiefs within the department, all of whom report to the prefect:

Department fire inspector

Department director of public health

Commissioner of police or chief of gendarmerie

Engineering chief of the Civil Engineering Service

In many parts of the United States this system of coordinating disaster operations could not be followed exactly because the police, fire, public health, and construction or maintenance departments work for different governmental units. Nevertheless, the method of integrating these operations under one commander seems preferable wherever it can be applied.

Disaster operations are directed initially to rescue, and secondly to salvage of material goods and facilities. Major responsibilities for these two immediate missions are assigned to the fire services, which are traditionally responsible for emergency and disaster assistance. The fire and emergency assistance forces also estimate the seriousness of the situation and the help needed. They are prepared to carry out resuscitation for drowning and electrocution accident victims, and to provide illumination where necessary to conduct rescue operations.

Assistance to the victims after their rescue, transportation to reception centers, and care of the victims at the rescue site or at appropriate institutions are the functions of the Public Health Service. Public Health officials mobilize hospitals, ambulance teams, and other medical and para-medical resources in the area.

To these two immediate services, two other services that can help and can protect the disaster operations have been added. The police must isolate the disaster area, provide for the movement of essential traffic, maintain order, enforce requisition orders, protect property, and identify and remove the dead. The police are also responsible for informing the prefect of the nature and seriousness of the disaster. Police responsibilities are assigned to the municipal police departments in urban areas and to the gendarmerie in rural areas.

Finally, the Civil Engineering Service provides assistance to the other three services in engineering, construction, transportation, and public works problems.

This general plan, as defined by the 1952 decree, has proven successful in fulfilling the mission originally anticipated for it. However, it has shown inadequacies in meeting certain types of complex disasters. Therefore, five detailed annexes have been developed for dealing with forest fires, floods, mountain disasters, railroad accidents, and plane crashes. Special plans have also been worked out for dealing with road accidents and, in hazard areas, with industrial or other radiological accidents. For each plan, one service is assigned top priority for operational assistance by virtue of its leading role in the disaster (e.g., medical service in a railroad accident, engineering service for a rock-slide).

In a number of disasters since 1952, the French Plan ORSEC has gained an outstanding reputation. It has been suggested as a model for other French-speaking NATO countries, for the United Nations, and even for the United States.

Emergency Procedures

To implement Plan ORSEC, it appeared essential to establish standard procedures. The general procedures required of individuals are shown on page 15 and are described below.

Immediate Vicinity

Although only the prefect of a department can initiate Plan ORSEC, the mayors of communities generally must take the first measures using their local resources, before more widespread assistance can reach them. The witnesses to an accident or to a disaster have even more immediate duties. Any witness to a disaster must report, by public or private telephone, to the gendarmerie or the police, who then call the competent authorities. The penal code provides penalties for any witness who ". . . voluntarily abstains from giving assistance to any person that he could have aided without danger for himself or for others, either by his personal actions or by calling for assistance." (This code might be useful in the United States to assure more prompt aid in traffic accidents and disasters.)

The disaster alarm is usually given by telephone. The telephone switchboard operator who receives the call must immediately contact the nearest gendarmerie or police station. The local gendarmerie or police station is to (1) notify immediately the closest local

assistance unit (such as a fire engine) attached to the commune, and (2) alert the local mayor and other authorities mentioned in Plan ORSEC. After verification of the report, the chief of gendarmerie or police in the immediate area is required to notify the district attorney, the sub-prefect of the arrondissement,* and the prefect. If the disaster is serious, the first policeman involved must directly notify the prefect immediately, so that Plan ORSEC may be implemented as soon as possible.

The mayor remains in general direction of disaster operations until the arrival of superior authorities and additional equipment. Community resources are then integrated into the departmental civil protection organization.

Since the mayor must oversee the important first emergency measures, he is required to continually maintain for his community:

1. A currently available inventory of equipment and material for rescue, transport of the injured, general transport, resuscitation, sanitary measures, etc.
2. A list of the available specialized personnel of the community (firemen, rescue teams, policemen, doctors, etc.).
3. Detailed public instructions in case of alert, and assignments for all disaster personnel.

As soon as the mayor receives a warning, he must alert the prefect of the department and the local people concerned by sirens, messengers, or other means. The local people and organizations that must be notified include:

1. The community fire department.
2. The first local assistance unit to which the community is attached (if not already notified) and in addition, the second such unit.
3. The nearest chief of gendarmerie or police station, or police commissioner, if not yet alerted.
4. One or more doctors with an ambulance or other means of transportation.
5. All citizens available and required for providing assistance.

The mayor must also anticipate the need for guides to direct the rescuers to the scene of the disaster, and for necessary security precautions to protect the population.

The mayor's mission is important, since experience has shown that the success of an operation depends on the promptness of help. By acting promptly with limited means, he may be able to do more than the prefect can do later on with much more powerful means. Needless to say, few mayors in the smaller towns of the United States maintain emergency plans as detailed as those of the Plan ORSEC.

*The arrondissement is a geographic sub-unit of a department; it may be considered as roughly comparable to our counties.

Community

To assist in responding to emergencies of moderate size, the emergency assistance organization within a department is divided geographically into 5 or 6 local assistance areas ("groupements"). The assistance areas are made up of groups of communal fire departments, and correspond roughly in size to an administrative arrondissement (of which there are 311 in all France—an average of 3½ per department). Each local assistance area is controlled from a single headquarters (see Figure 1). The headquarters chief is appointed by the prefect, and is assisted by four service chiefs who are appointed by their respective departmental service chiefs. Personnel and equipment of all these services (such as policemen and gendarmerie of the arrondissement, local hospitals, and private industrial resources) may be placed under the control of area assistance headquarters in an emergency.

If an emergency occurs, the chief of the local assistance area will be notified by the first witness, the police, or the local mayor. He then dispatches the closest local assistance unit, if it has not already responded, and orders the senior officer of that unit to take operational command at the scene and to report on the situation. The chief of the local assistance area notifies the second local assistance unit (predesignated) to stand by, or dispatches it immediately if necessary. He alerts the prefect, the sub-prefect of the arrondissement, the chiefs of the health, engineering, and police services and their emergency assistance aides within the arrondissement, and sends a pre-alert notice to his neighboring assistance areas.

Department

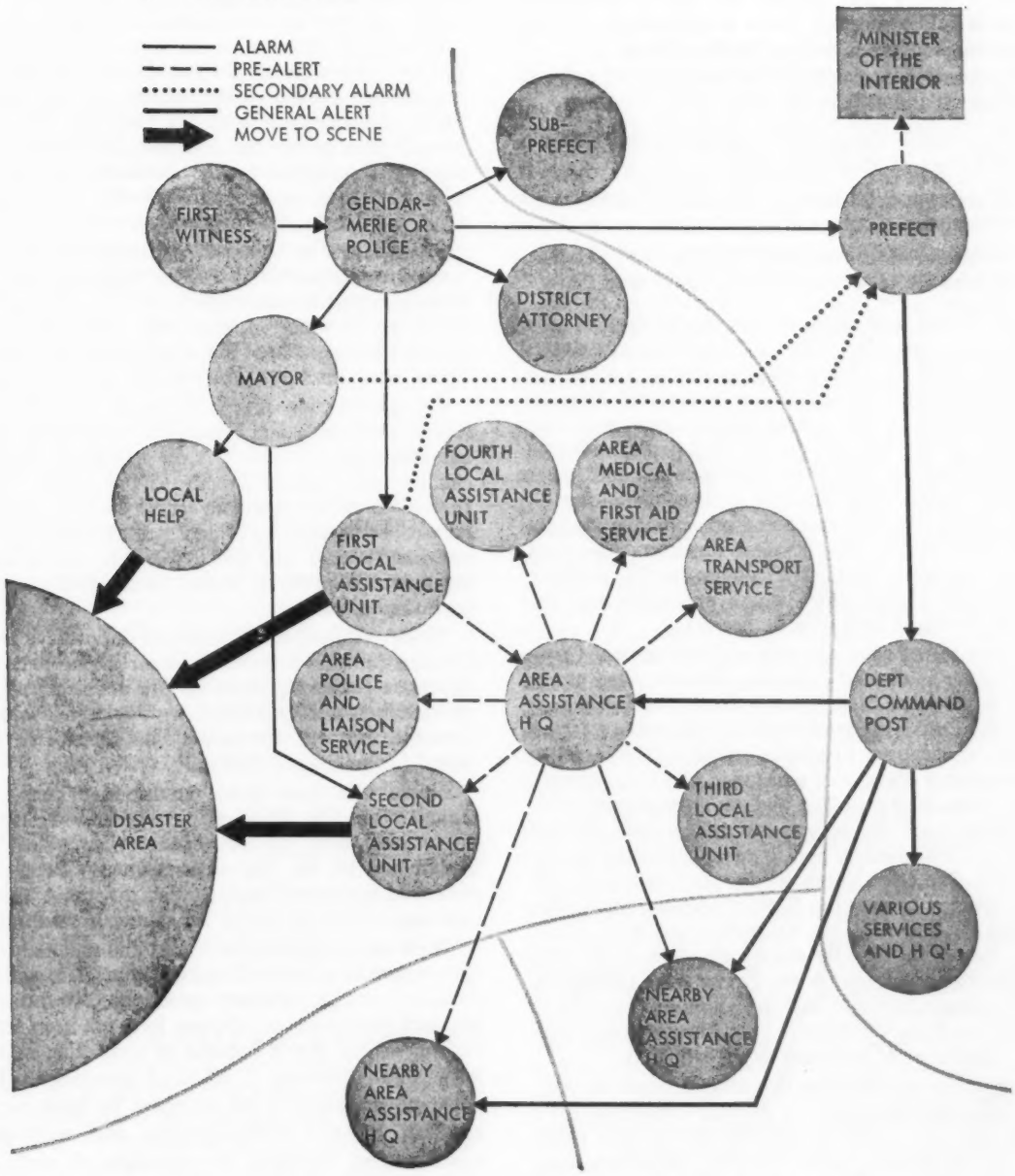
Further action depends on the prefect's decision to declare Plan ORSEC operational. This decision may be taken (1) upon receipt of reliable information concerning the severity of the disaster and of required action, (2) immediately if the prefect is in the locality and is personally aware of conditions, or (3) through delegation by his secretary general, if the prefect is on his way to the scene or otherwise out of communication.

When the alert is declared, certain members of the prefect's staff are notified, in the following order:

1. The secretary general (deputy prefect)
2. The operational director of assistance
3. The sub-prefects of all arrondissements within the department
4. The inspector of fire and assistance services
5. The directors of ORSEC operations within the four services of fire, police, engineering, and public health
6. The chief of gendarmerie and the chief of the police department
7. The chief engineer of public works

Figure 1

EXECUTION OF PLAN ORSEC IN A DISASTER



Source: Instruction Interministérielle - Plan "ORSEC", Imprimerie Nationale, Jan. 1958.

8. The director of the public health department
9. Communications technicians in the department
   a. Chief of the communications center
   b. Director of telephone and telegraph service

If the disaster occurs outside normal working hours, the police and gendarmerie must dispatch four messengers to notify those officials who cannot be reached by phone. The meeting place is predesignated, and notices are ready for delivery to the officials.

The sounding of an ORSEC alert triggers three types of activity at the department level:

1. Activities by the chiefs of the four primary services, and their assistants and staffs.
2. Organization of a Fixed Command Post and an Operational Command Post.
3. Mobilization of necessary utilities and services, such as the telephone system and the Red Cross.

Each of the four service chiefs implements his own ready-made plan. The chief of the gendarmerie passes the alert on to his section chief in the local area, and through him to the chiefs of gendarme brigades (detachments) in the communities concerned. The inspector of the fire service passes a general alert to all areas and to individual fire stations and other assistance units. The director of the public health department alerts ambulance and other mobile medical teams, and notifies the hospital directors who may become involved. The chief public works engineer notifies those organizations whose operations may be affected, or whose help may be needed.

At the time of alert, the normal departmental Command Center is divided into two elements. One group travels to the scene of action and forms the Operational Command Post. This group includes the prefect (if he considers it necessary to oversee operations in person), the operational director of assistance, the four primary service chiefs, and an office and communications staff. The functions of this post are to collect and pass on operational information, and to request reinforcements as needed. The other group stays in the capital city of the department to man the Fixed Command Post. The functions of this post are to collect and pass along information concerning the overall situation, to provide for resources requested by the Operational Command Post, to supply expected logistics support (food, fuel, etc.) and to keep the central French government and other superior levels informed of the situation.

Many agencies within the department (such as telephone officials) who may be directly concerned with the disaster are notified immediately through the alert. Others can be placed on standby and if necessary used by special order from their officials in the department. Army forces, the mobile gendarmerie, and the CRS (military internal security forces under control of the Ministry of the Interior) would be mobilized in this manner.

Other Questions

If it seems that the disaster has been caused by a crime or willful negligence, the gendarmerie or the police can start an investigation as soon as they arrive on the scene. In such a case, they would notify the district attorney's office. The district attorney or the responsible judicial police officer has the power to forbid disturbance of evidence and to gather evidence himself even before the first operations of the judicial inquest. Exceptions to the evidence restrictions are allowed if required for public health or safety, or if necessary for the care of victims.

Requisitions of personel and material for disaster use are legally permitted. Failure to comply with requisitions is punishable under the penal code. Any person in the area, including non-citizens, and any kind of organization capable of participating in assistance (Red Cross, etc.) can be requisitioned in case of disaster.

Requisitions are preferably made by written notes sent to the people and organizations involved, so as to avoid litigation. However, in an emergency requisitions can be oral if made directly to the people involved. In case of an exceptionally grave disaster where it is impossible to send individual notifications or to give individual orders, any effective means can be used for the transmission of the orders (bells, trumpets, sirens, press, radio, etc.)

People requisitioned for disaster duties have the right to claim damages if accidents occur during their period of service (assuming that they are not negligent). The community is also responsible for damages involuntarily caused to property by people who have been requisitioned for emergency duties.

People who have been requisitioned can ask for remuneration for their services (perhaps in the form of vacation time for personal services or monetary indemnities for the use of equipment). People using their own equipment can abandon it without losing the guarantee of remuneration for damages resulting.

These rules regarding personnel and materiel requisitions prove very useful in taking immediate actions to combat specific disaster situations. Unfortunately, standard procedures of this type have not been set forth for the United States because of conflicting state and local laws. However, a standard recommended plan could be promulgated for adoption by local areas, to establish common understandings and methods for requisitioning resources in peacetime as well as in wartime. ▲

NATIONAL DEVELOPMENTS IN THE EMERGENCY MEASURES PROGRAMME

Address by Paul A. Faguy, Director of the Emergency Measures Organization to the Annual Conference of The Canadian Federation of Mayors and Municipalities at Windsor, Ontario, Wednesday, May 19, 1965.

I APPRECIATE the opportunity to speak to this conference because I believe that emergency measures or civil defence, at the municipal level, is most important. All of us involved in civil emergency planning must remember that people live at the municipal level, not at the federal or provincial levels of government. In municipalities, families live, resources and services are located and municipal officials with a knowledge of local conditions and local requirements are available to deal with emergencies. Civil defence would not be completely effective without the active participation of municipalities. We, at the federal level, in the federal Emergencies Measures Organization, and I am sure this applies also to the provincial governments, must have your support, in the municipalities, if we are to be successful in civil defence. When discussing Civil Emergency Planning, one should remember that it covers two major aspects: the protection of the population to help ensure its survival or civil defence, and also continuity of civil government at all levels, because we firmly believe in a very basic and very sound principle: that in an emergency, in time of disaster, civilian government, whenever possible, must continue to provide local leadership to the population. This is essential. However, one must keep in mind that all of these measures have only one purpose: to help to protect you and your families. Let's remember that even the plans to ensure continuity of government are made not to protect government officials, but to help people survive.

Many people wonder why there should be Civil Defence today. There are three very good and basic reasons:

(1) War is still a possibility, unfortunately.

(2) In any future war, Canada would be affected.

(3) Civil emergency planning or Civil Defence is an integral part of total defence.

That war is still a possibility there is no doubt, one has only to look at the world today: tensions continue, subversion exists, the arms race is still on, one day the international situation appears improved and the next we seem to be on the brink of war. We must remember the crises in Berlin and Cuba—now problems are cropping up in the East. China has the bomb and *will most likely have* the means of delivery within the *next few years*. With the present South Vietnam situation we are learning the meaning of the word "escalation". We do not say that war is inevitable and always maintain hope that it will never happen. Unfortunately, we cannot get away from the problem: War is still possible, and we must recognize that Canada would be affected the next time. In previous wars we went overseas to fight and had months and even years to get organized for it, and to get the Canadian economy geared to war needs. Not so next time!

Situated as we are between the two major powers in the world, Canada would be affected either by direct attack on our country or as a result of attacks on the United States and the resulting fallout.

Obviously a nuclear attack would inevitably produce great confusion. So we must plan ahead. Plans cannot be on a "stop and go" basis but must be long-range, we must identify and study the problems, prepare the necessary plans now and designate our emergency officials while we have time. The better prepared we are to set up ways for restoring essential services, the quicker would be our recovery and the more certain our survival.

That Civil Defence is part of total defence is now accepted generally. This principle was stated in the White Paper on Defence of Great Britain, was announced by President Kennedy and lately President Johnson and neutral countries such as Switzerland and Sweden have accepted it and have very good civil defence programmes. #In the *USSR* the new organization has developed an extensive programme to cope with all-out nuclear attack.#

President Johnson stated very recently "An effective civil defence program is an important element of our total defence effort".

Mr. McNamara said "The effectiveness of an anti-ballistic missile system in saving lives depends in large part upon the existence of an adequate civil defence system" . . . "That recommendation (of production and deployment of anti-ICBM systems) will be entirely contingent upon acceptance of a satisfactory fallout shelter program. *Without a fallout shelter program, there is no basis whatsoever for deployment of an anti-ballistic missile system.*"

PAUL A. FAGUY

Also more recently he is quoted as saying "Civil defence is an integral and essential part of our overall defence posture. I believe it is clear from my discussions of the Strategic Retaliatory and Continental Air and Missile Defense Forces that a well-planned and executed nation-wide civil defense program centred around fallout shelters, could *contribute much more, dollar for dollar, to the saving of lives in the event of a nuclear attack upon the United States than any further increases in either of those two programs*".

That civil defence is part of the total defence was also recognized by the Canadian Government and by Parliament when our Minister, the Honourable C. M. Drury, was requested to appear in front of the Special Parliamentary Committee on Defence. In his official presentation the Minister said: *"If military defence is required, so is civil defence"*. This is our basic and I believe our most logical argument. The Parliamentary Committee agreed to our programme. The above, therefore, indicates the need for civil defence, the priority given to it by other countries as part of defence and the recognition and support of the Canadian Government.

Many developments have occurred recently, at the national level, in civil defence.

(*a*) The Government has made the federal Emergency Measures Organization an independent agency, with the Director directly responsible to the Minister. Therefore, the Minister gives his personal attention and consideration to the policies, plans and programmes recommended by the Director of EMO, as his deputy head.

(*b*) The Government has approved the construction of a new civil defence college so that all training facilities will be grouped together in one structure. The basement of the college would provide the necessary facilities and fallout protection to accommodate relocated government personnel near Ottawa in wartime. This indicates not only support to the emergency measures programme but to the continued role of the college and the need for long-range training in emergency measures.

(*c*) We have established our programme on a basis of priorities which were clearly stated by our Minister to the Defence Committee last June. The Special Parliamentary Committee agreed generally with our programme. This indicates clearly a support or recognition of the need for Civil Defence from all political parties in the House of Commons.

(*d*) We have continued to make plans for the provision of warning of attack, through the Canadian Army.

(*e*) We now have an emergency broadcasting system, under the control of the CBC, ready to operate through radio and TV stations, covering more than 98% of the population, to give instructions to the public in case of emergency.

(*f*) We are reviewing our public information programme to make it more effective, so that the public will know what to do when they receive a warning or in time of disaster.

(*g*) We have continued to stockpile emergency medical supplies across Canada, more than 15 million dollars worth so far, with another $5 million foreseen to complete the programme over the next three years. These supplies are available for use in emergencies, whether peacetime or wartime, by provincial or local agencies.

(*h*) Plans continue to provide for emergency welfare services in feeding, lodging, clothing and other personal services, for supplies and for radiological defence.

We have initiated a system for the analysis, in peacetime, of all essential resources in Canada and, this is most important, for the rapid evaluation of the remaining resources after an attack to help ensure the survival of people and to assist in the recovery of the Canadian economy. A study has been made of the remaining resources 30 days after a hypothetical but rather heavy attack on Canada. There is every indication that the Canadian economy would survive. There would be areas of shortage but people would have enough to live on! This would not be the end of the world! We are working closely with the United States on the analysis of wartime resources and on the situation of the whole of North America after an attack on the continent. I might add that we have an official agreement with the U.S. to work closely on all aspects of emergency planning as if there were no border.

With regard to continuity of government, we have near Ottawa a complex of emergency facilities from which the federal government would operate. Regional Emergency Government Headquarters are now operationally ready, with the necessary communications in 6 provinces to ensure continuity of provincial government and of the federal elements located in the provinces. We have drafted emergency orders in council and regulations to clarify the delineation of authorities, the delegation of authority and decentralization of services. Departmental War Books and Readiness Plans have been prepared so that all designated officials will know what to do, quickly. Time is not available to go into greater detail on the results we have obtained to date. I would like to recommend, however, that you read the EMO National Digest for August 1964, where we have reproduced the complete statement of the Minister to the Special Parliamentary Committee on Defence and also the Digest for October 1964, where we have publicized the report of the Defence Committee on civil emergency planning and the reply of our Minister to the Committee's recommendations, which generally supported emergency measures. Please read the August and October 1964 EMO Digests—you'll find them most informative and interesting.

There are three other national developments which I would like to discuss with you today because of their importance:

(*a*) First, the greater emphasis we want to place on the ability of local EMO or CD organizations to cope with peacetime disasters.

(*b*) Second, the approval by the federal government of a national public fallout shelter survey, and

(*c*) Finally, the studies of the risk of attack on targets in Canada and of the fallout probabilities based on attacks on the whole North American continent.

We all hope that war will never come—it may never happen but one thing is sure: peacetime disasters will keep on happening. We have only to remember Alaska and the Albernis a year ago, the recent snow slides in B.C. and the Ville LaSalle explosion near Montreal, fires, floods and snowstorms where immediate help is needed to prevent loss of lives and to assist people in need with essential services. We want to encourage, to stimulate local civil defence organizations, through the Provincial organizations who have the direct responsibility to be ready to cope with peacetime disasters. What it does mean, however, is that your local organization in each municipality, should be ready to react quickly so that each one of you, locally, will know what to do. The civil defence or EMO co-ordinator should know which officials to call, what equipment and other resources are available in his municipality and in surrounding areas, what people should do. What is needed mostly is time and effort to plan, ahead of time, with the necessary inventory of records on hand to be used, quickly. I would like to recommend that you give very serious thought to this most important aspect of emergency planning. I realize that a good deal has been done already in some provinces and in some municipalities. This has been proven in many instances in disasters in the past. But there is no doubt there is much room for improvement. We, in federal EMO, want to see this aspect of emergency planning become an essential condition of the financial assistance programme. Incentives should be created to encourage adequate planning for peacetime disasters. Please go back to your municipalities and ensure that the necessary thinking and planning have been done to cope quickly with an emergency and to save lives. This is the best way we can prove the usefulness of emergency planning or civil defence right now in peacetime.

Another development I want to discuss, is the approval given recently by the federal government for the initiation of a national public fallout shelter survey. One of the more serious, if not the most serious, criticisms of our civil defence programme has been the lack of fallout shelters for the population. We recognize that in any future war against the North American continent, the major problem would be radioactive fallout. Even if no targets were hit in Canada, fallout would result from attacks on military and industrial targets in the United States. We admit that we have not been successful with our home shelter programme. Most people will not spend $300 to $500 for a home shelter when they can use their hard-earned money on everyday needs. The solution is clearly public leadership and a programme of public community shelters. We are not considering blast bomb-proof shelters at this stage because the cost of such a programme would be exorbitant. We are considering, however, fallout shelters being provided in already-existing buildings, at very minimal costs, with a minimum of shielding or protection, ventilation, water and sanitation.

In order to arrive at a recommendation based on known factors, a survey of all federal buildings in Canada has been carried out and it indicates that half a million shelter spaces are available with little modification, and another 600,000 with some modification. Many municipal EMO organizations have already carried out their own surveys. Last summer in Alberta, federal EMO in close co-operation with the federal Department of Public Works, completed a survey of all large buildings. The data has been computed and the results indicate that a great number of buildings provide a good protection factor against fallout. There are in Alberta now over 440,000 spaces with a protective factor greater than 100, with an additional 185,000 with a factor of 50+, for a total of 635,000 existing suitable spaces. There are another million spaces with a protection factor greater than 10, which is better than you would normally find in private homes. Over and above these, there are more than 1,000,000 potential shelter spaces with a protective factor greater than 50 which would require modifications, however. So over 1,600,000 shelter spaces exist which give a better protection than found in private homes. This is most encouraging considering that the total population of Alberta is approximately 1,400,000. However, there is one major difficulty: the shelter spaces do not necessarily coincide with the population distribution. We would have to make use of shelter spaces requiring modifications such as improvements for shielding, ventilation, sanitation, or stand-by power in some cases. On the basis of these most encouraging findings, the Government has now approved a national survey of all existing buildings, except private homes, across Canada. This is a great practical step forward. We hope to provide protection against fallout for a majority of the population. A national public fallout shelter programme will do a great deal towards obtaining public support for civil defence.

One last important development I should mention is the studies being carried out now to bring up to date our basic planning assumptions. On the basis of the best possible advice available in Canada, we have

made a review of the list of likely targets in Canada, both civil and military, and we are proceeding now with a careful study of the fallout probabilities on Canada, resulting from attacks in both the United States and Canada. As soon as these studies are completed, we will make this information available to all provinces, municipalities and agencies concerned, so that all concepts, plans and programmes can be amended and improved accordingly, on a basis of priorities, keeping in mind especially the priority of certain geographical areas, identified as a result of the fallout probabilities study. This will allow EMO to identify municipalities who should provide for reception of evacuees, the location of fallout shelters on a priority basis and so forth.

All developments in the national plan will be considered and reviewed by all provinces at the time of the proposed federal/provincial conference which will be held on the 17th June. There is continuing close consultation with the provinces, at all times, on civil defence and EMO matters.

As you can see, EMO is still alive, civil emergency planning is moving ahead. A great deal has been done, but many programmes have to be completed and all of our plans must be reviewed in the light of the revised planning assumptions. We must not be afraid of changes where necessary. Emergency Measures is a difficult field but it is unique, interesting and most challenging. It could affect millions of people in times of emergency.

When you go back to your municipality make sure that you will be ready to cope with all types of disasters. Ask your civil defence co-ordinator to prepare a plan if he has not done so already.

Make sure that all plans are ready, written down in black and white and approved by the Mayor and Council. Once the plans are approved, they must be tested regularly, exercises must be held locally and studies carried out with officials concerned. There may be difficulties at times, it will require time and effort on your part. However, remember it is for a good cause, the protection of people and the saving of lives and this may involve your own neighbours or even your own family.

Gentlemen, I thank you for your attention and wish you the best of success with your conference. ▲

PROJECT HARBOR—from page 9

2. Institution of vaccination and immunization procedures that can be applied nationally.

3. Study of the biological and pharmaceutical industry and the production of medical instruments. Possible bottlenecks in the production of medical supplies should be uncovered and means found for the speedy restoration of production.

4. Organization of the medical elements within the mobile units discussed in the Immediate Survival summary.

5. Study of altered patterns of the medical care of displaced and economically distressed people.

6. Research on consequences of a possible change in available food, in particular the possibility that deficiencies may develop if certain types of food become unavailable. The problem of feeding babies during the period in which there is too much iodine activity in milk has been mentioned.

The panel recommends the construction of emergency hospitals at appropriate sites. Plans should be formulated also for the repair, reconstruction, and decontamination of hospitals, medical and paramedical schools, and of related structures.

General problems. The panel was concerned that, until the recovery problems and requirements are more thoroughly studied, present inadequacies in such areas as communications and warning and command and control are not likely to be removed. The panel urges that the OCD consider the establishment of a post-attack-operations development group to serve as a pilot-study and operations-evaluation group. Thus experience could be gained and organizational techniques created that could be used as the civil defense program expands.

An expanding program will emphasize the need for better understanding of the relationship between survival and recovery. Such knowledge would not only permit better determination of the balance of effort between these programs, but might also lead to a closer integration of programs for recovery with the normal economic and social programs of the United States. ▲

If undelivered return to:
EMERGENCY MEASURES ORGANIZATION
Daly Building,
Ottawa, Canada

CANADA
POSTAGE PAID
PORT PAYÉ